SECTION NEWS

National Capital

The annual joint meeting of the Section and the Baltimore-Washington Chapter of NACE was held on February 26 in Laurel, MD. The speaker for the meeting was Paul Jett of the Freer Gallery of Art/Arthur M. Sackler Gallery of the Smithsonian Institution. Mr. Jett has been with the Freer Gallery as a conservator since 1983, and in his current position since 1997.

Mr. Jett spoke on "Corrosion & Art: Decorative Techniques Used in Metalwork Throughout History." Artists and metalworkers throughout history have used corrosion processes and products in the creation of works of art. The talk highlighted some of the more outstanding examples of this phenomenon with slides of objects from around the world in the Smithsonian collection. He discussed the methods used by the artists, the works of art that resulted, and the techniques used by conservators to identify and duplicate artificial the corrosion processes.

The Section met for their second annual Student Night on April 25 at the Campus of the University of Virginia in Charlottesville, VA. The intent of the annual event is to acquaint students and their professors with the local Society and its members, and in turn, enable Section members to become familiar with some of the abundant new science and engineering talent in the National Capital area.

Four posters were displayed: Noah Budiansky talked about "Origins of Persistent Interaction Among Localized Corrosion Sites Investigated Using Experimental Electrode Arrays;" Christain Franck, displayed his poster on "Exfoliation Growth Kinetics in 7XXX Series Alloys;" Feng Gui talked about his poster, "Laboratory Evaluations of Corrosion Prevention Compounds in Aircraft;" and Marta Jakab presented her work on "Storage State and Mechanism of Cerium, Cobalt, and Molybdenum Ion Release from Oxides on Aluminum and Synthesized Metal-Rare-Earth Metal Alloys."

After dinner, the featured speaker Roland Oltra, Director of Research, Laboratory for Research on the Reactivity of Solids, University of Bourgogne, Dijon, France, presented his work on "Microscopic Studies of Pitting Corrosion Initiated by HCl Microinjection using SVET, AFM and AES."

The Section met on May 28 in Alexandria, VA. Two high school science fair winners were present with their posters (Megan Bell from Osbourn High and Mary Brazelton from Bishop McNamara High) and were recognized for their achievements.

The 2002 William Blum Award was presented to Dr. Thomas P. Moffat for original and important contributions to both electrodeposition and corrosion at the fundamental and practical levels. Dr. Moffat's award presentation was entitled "Superconformal Film Growth."

New England

The Section held a meeting on May 7 in Boston, MA. The featured speaker was Dr. Paul M. Natishan, Secretary of ECS and Group Leader for the Center of Corrosion Science and Engineering at the Naval Research Laboratory. After presentating a progress report on the current status of the Society, Dr. Natishan offered an overview of his group's work entitled, "Electrochemical Oxidation of Phenol Using Boron-Doped Diamond Electrodes." Expanded metal mesh of either tungsten or titanium were subjected to chemical vapor deposition of boron doped diamond dust and served as working electrodes in the study of the oxidation of phenol in aqueous sulfuric acid to product carbon dioxide. The oxidation was studied by CV. A number of oxidation products were identified. A flow cell was set up and run for 4500 minutes and reduced carbon content from about 1% to less than 0.1% without fouling electrodes and exhibiting and any decrease in decomposition rate. Experiments are continuing.

San Francisco

The Section had a meeting on March 27 in Berkeley, CA. The presentation, "Materials Development for Direct Methanol Fuel Cells," was given by David L. Olmeijer of PolyFuel.

The proliferation of portable electronic devices in the consumer marketplace has drawn attention to the need for the development of more sophisticated energy storage systems. Direct methanol fuel cells (DMFCs) may potentially offer more than five times the energy density of a lithium ion battery, and with an essentially instantaneous recharge capability.

A key requirement for the success of this technology is the use of a fuel that contains a high concentration of methanol. Nafion, the membrane typically used as the electrolyte in proton

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2002 Cubicciotti Student Award

DEAN WHEELER received the 2002 Cubicciotti Student Award from Barry Gordon, the representative of Structural Integrity Associates, at the meeting of the San Francisco ES&T Section on May 1.

Wheeler presented a talk entitled "Prediction and understanding of transport in electrolytes using molecular simulations." He discussed adaptations of the well-known Stefan-Maxwell equation, which are often used to model mass diffusion in concentrated multicomponent electrolytic systems. Molecular simulations can be a fruitful approach in both predicting the required diffusion coefficients and understanding their connection to atomic-scale phenomena. Two complementary methods were created for generating a full diffusion-coefficient matrix for simulated solutions of an arbitrary number of components, and they have been applied to liquid electrolyte systems. Dean presented results from simulations of $LiPF_6$ salt in liquid carbonate solvents as used in lithium batteries. The simulations give insight into the decrease in conductivity as salt concentration is increased.

Wheeler received a BS in chemical engineering at Brigham Young University. He will soon complete his PhD in chemical engineering at UC Berkeley under the direction of Prof. John Newman. Recently, Wheeler accepted a position as an assistant professor at BYU.

Wheeler and his wife have a four-year-old son and a two-year-old daughter.

Section News

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exchange membrane fuel cell technology, is less than ideal for DMFC use due to its cost, high methanol crossover, and inability to be used at high concentrations of fuel. This has led to the development of numerous alternative proton-conducting polymer membranes with reduced crossover.

The speaker discussed the strategies used for development of alternative, low crossover membranes for DMFC use, the materials concerns for operation in a high methanol concentration environment, and the challenges involved in the preparation of membrane-electrode assemblies using alternative membranes.

The Section had a Student Night meeting on May 1, 2002 in Berkeley. There were three student speakers. The first speaker Dean Wheeler (UC Berkeley), winner of the 2002 Cubicciotti Student Award (see above).

The second speaker was Tom Eriksson (Lawrence Berkeley National Lab) who gave a presentation on "Surface Film Formation on $Li_xMn_2O_4$ Electrodes." The presentation discussed the work on the reactions at the $Li_xMn_2O_4$/electrolyte interface in carbonate based electrolytes, in Li-ion batteries. The effects of temperature, state-of-charge, electrolyte-salt, and cycling vs. storing were discussed.

The third speaker was Karen Thomas (UC Berkeley) who gave a presentation on "Thermal Effects in Electrochemical Systems." Two aspects of heat generation particularly relevant for porous solid-solution electrodes were discussed. The first aspect is calculating the amount of heat produced while a cell is relaxing after passage of current. This heat is produced because of relaxation of concentration gradients in the electrolyte and in the insertion material, and thus is a "heat of mixing." The second aspect is entropic heat generation. Because insertion compounds are solid solutions, the entropy of reaction changes substantially with concentration, which is related to the state of charge in a lithium ion battery. ■

For ECS Section Awards information, please see page 47 in this issue.